

Spacequakes and Interchange Oscillations Toffoletto, Rice

In a 1999 paper, Chuxin Chen and Dick Wolf presented results of simulations of the motion of a low-entropy bubble in the plasma sheet, suggesting that bursty bulk flows were bubbles. In that simulation, the bubble exhibited a highly damped oscillation before coming to rest in the inner plasma sheet. In collaboration with Chuxin Chen of the University of Science and Technology of China, Dick Wolf and Frank Toffoletto have recently carried out a much more detailed study of these oscillations, which are not simple MHD waves, and are best described as "interchange oscillations". The top panel of the figure below shows the computed equatorial velocity of a bubble. The lower panel, which shows velocity measurements made from the THEMIS P2 spacecraft during a bursty-bulk-flow event, exhibits an oscillatory motion that observers have called a "spacequake". The properties of the spacequake are in good agreement with those of the theoretically expected interchange oscillation.

The theory of interchange oscillations was presented at the ICS-10 workshop in March 2010 and the Western Pacific Geophysical Meeting in June. The observational plot was adapted from *Panov et al.*(*GRL*, 37, L08103, doi: 10.1029/2009GL041971).

